

Proposed West and Southeast LRT Intersection Service Levels and Design Options

(K. Leibovici)

Recommendation:

That the December 8, 2010, Transportation Department report 2010TD9422 be received for information.

Report Summary

This report provides a summary of key intersections performance along the southeast and west LRT, and various timeframes.

Previous Council/Committee Action

At the June 29, 2010, Transportation and Public Works Committee meeting, Councillor K. Leibovici made the following inquiry:

That Administration provide a report outlining the following:

- current level of service (i.e. D,E,F) of the major intersections along the proposed west and southeast LRT route
- the level of service of those major intersections opening day of the LRT
- the projected level of service 30 years from now
- Design options being considered to alleviate some of the vehicle congestion along this route.

This report is to be provided in the fall of 2010, at the same time as the concept plans return to Council.

Report

Background

- The guiding principles in the Transportation Master Plan – *The Way We Move* identify moving the city towards a transportation system focusing on providing a premium transit service and encouraging a shift to transit. This inherently identifies that premium transit services like LRT will be given priority over auto traffic. In consideration of these principles there will be impacts to auto traffic that traditionally have been considered unacceptable.
- As urban centers grow, increased transportation demand can be met in a number of ways. One of the most efficient ways is through more effective use of transportation corridors and rights of way through investment in public transit. Travellers may have other choices such as alternating their travel route, travelling outside the peak hour, carpooling, or possibly working from home. *The Way We Move* encourages increased use of these strategies for moving people in Edmonton. Increases in vehicle capacity would be limited to major goods movement corridors, such as the inner ring loop and major roadway connections between Anthony Henday Drive and the Inner Ring Road.
- Level of service (LOS) for intersections is a performance measurement that denotes an operating condition that occurs on a roadway when it is accommodating

specific traffic volumes. It is a qualitative measure that characterizes operational conditions within a traffic stream and their perception by motorists. The calculation of LOS is based on a ratio of the volume utilizing the transportation facility in comparison to the available capacity within the facility (volume to capacity ratio).

LOS can be determined for all movements in the intersection or the intersection as a whole. For signalized intersections, LOS is typically presented in a range from B to F with B representing very low delay and E and F operating at or near capacity. For example, a Volume to Capacity ratio of 0.75 means that the intersection is operating at 75% of its capacity which represents a LOS of D.

- LOS is analyzed for the AM and PM peak hours. The duration of Edmonton's peak averages 15 to 30 minutes in each of the morning and afternoon peak hours. This is significantly less than many urban areas in North America. Major centers such as Toronto, Vancouver, Montreal, and most U.S. centres are experiencing "peaks" many hours in duration.
- For this assessment the following key intersections were identified along the West and Southeast LRT Corridors as they represent locations where the combination of existing traffic volume, lane restrictions on the arterial roadway, and LRT operation are expected to have the greatest impact. The majority of the intersections are located on the WLRT line:

- 87 Avenue/178 Street
- Stony Plain Road/149 Street
- Stony Plain Road/142 Street
- Stony Plain Road/124 Street
- 104 Avenue/116 Street
- 82 Avenue/83 Street

Current Level of Service

- Today these intersections exhibit heavy peak hour use. Congestion issues do not exist in non-peak hours. Depending on their location, the intersections experience varied degrees of commuter and commercial traffic.
- 87 Avenue is used as a commuter corridor but it also serves commercial areas that result in varied travel patterns through the intersections. Today, Stony Plain Road is utilized as primarily a commuter corridor to and from the Downtown. The 104 Avenue/116 Street intersection experiences commuter traffic but also serves a large commercial area. The 82 Avenue/83 Street intersection accommodates commuter traffic and serves commercial areas but also serves as a major connection to Sherwood Park.
- Today each of these intersections exhibit certain movements with LOS values of E depending on the period of the day but overall intersection LOS ranges from C to D. LOS values are provided in Attachment 1.

Opening Day Level of Service

- Opening day for the West and Southeast LRT line is assumed to be 2016 and we have used that

timeframe to develop the corresponding LOS. Developing the 2016 year projection is based on outputs from the Regional Travel Model. The model takes into account the various lane modifications along the LRT corridor, increased population and employment throughout the city and along the corridors, various other changes that may affect travel choice (relative travel time for auto and transit, price of fuel, parking, transit fares, etc.) and calculates future auto and transit use including readjusted traffic flows to adjacent corridors.

- Based on the analysis and projected traffic volumes each of the intersections listed above exhibit LOS values of either E or F. (Attachment 1)
- Once intersection LOS reaches F for extended periods of time, drivers will not tolerate excessive delays and they will begin to alter their travel behavior as previously described (route, time of day for journey, etc).

30-year projected Level of Service

- Similar to opening day, the 30-year projection is based on outputs from the Regional Travel Model developed for the year 2041. The model uses the inputs identified above, but are adjusted to reflect characteristics of 2041.
- Based on the analysis and projected traffic volumes each of the intersections listed above continue to exhibit LOS values of either E or F. (Attachment 1)
- The most compelling conclusion from the results from the regional travel model is that while auto traffic

volumes increase the future, a large amount of these increases occur on major roadways outside and on the inner and outer ring loops. This is expected given the high standard to which these facilities are constructed and the fact that there are a limited number of roadways within the inner ring loop to shift demand to.

- The Transportation Master Plan does not envision roadway widening within the inner ring loop. As such, many locations within the inner ring loop are expected to approach and reach LOS E and F. The Transportation Master Plan suggests that Public Transit will be the means by which peak hour commute times to the Downtown are maintained or improved.

Design Options

- Throughout the LRT concept planning process there are “General” design options that are utilized to help manage vehicle congestion.
 - Elimination of left-turn movements from shared lanes along the two LRT routes to minimize the impacts on through lanes. Left turns must either have their own turn bay, or won't be allowed at the intersection which is partly related to train operation and safety, but also is a way of trying to minimize impacts to through traffic.
 - Where feasible, adjusting intersection layouts to allow for high demand auto left turns to operate concurrently with train movements, particularly where intersections require double lefts. This allows for the most flexibility in mixing and matching the

- combinations of left-turn phases to minimize impacts of train/vehicle conflict.
- Eliminating certain movements that are either low volume or can be accommodated in another manner provides opportunities to better accommodate the train movements.
 - Examining the larger transportation network and incorporating a series of “off route” intersection improvements to enhance capacity for routes paralleling the LRT corridor or provide better neighbourhood access/egress from/to the arterial road network.
 - Examine alternatives to consolidate accesses at signalized intersections to minimize the number of roads/lanes intersecting with the LRT route along with consolidation of formal pedestrian crossings.
 - Adopting a more “urban” LRT design philosophy whereby the LRT and auto traffic signals are more fully integrated in an effort to reduce the traffic impacts when the LRT passes through intersections. This includes minimizing the use of railway crossing signals and gates where possible.
 - Elimination of on-street parking in some areas increasing through traffic capacity by eliminating or reducing parking/through traffic conflicts. In other cases, parking can be eliminated at intersection approaches to allow for an additional storage capacity.
- Some of the specific design adjustments/measures to address capacity issues include:
 - The concept design provides grade separation of 75 Street and 170 Street protecting the integrity of the recognized goods movement of the inner ring road.
 - At 87 Avenue and Meadowlark Road the concept plan identifies southbound double lefts to accommodate the loss of southbound lefts on 156 Street at 87 Avenue.
 - Provision of a new, signalized/rationalized access for the hospital, opposite 169 Street.
 - In consideration of the reduction in travel lanes along Stony Plain Road improvements on 107 Avenue have been identified at 142 Street and 149 Street to enhance intersection capacity.
 - The LRT alignment at 142 Street aligns to the north to remove the train vehicle conflict from the strong AM and PM commuter movement between 142 Street and 102 Avenue.
 - The concept design has developed a provision of formalized/signal-controlled U-turn opportunities at either end of Groat Estates to accommodate east/west movements.
 - At the 83 Street/Whyte Avenue intersection there is consideration for a third eastbound through lane from 85 Street to east of 83 Street to provide additional capacity.
 - In consideration of the impacts at the Whyte Avenue/83 Street intersection the concept plan has considered “off route”

- improvement at 85 Street with the addition of southbound double lefts.
- The concept design proposed that the Bonnie Doon traffic circle is replaced with a traditional four legged major signalized intersection splitting the east/west travel patterns between 90 Avenue and 82 Avenue. This combined with the elimination of some movements at the south-leg of 85 Street reduces the complexity of the intersection.
 - At the 75 Street/Whitemud north ramp terminal intersection the southbound left turn-lanes have been extended reducing probability of the traffic queues blocking through movements.

Policy

LRT planning and construction is consistent with polices identified in the Transportation Master Plan.

Focus Area

LRT planning and construction aligns with the City's 10 year strategic goals of shifting its transportation mode and transforming Edmonton's urban form.

Attachments

1. Intersection LOS